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ABSTRACT

The dates of birth and dealth of famous mathematicians and their major contributions to mathematics are described. Over 120 mathematicians are included. Six references are listed. (YP)

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Mathematician of the Day
A Birthday Party or Moment of Silence

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by

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Do you need a little something to break a student trance during one of your more stimulating mathematics lectures? How about celebrating the birth or mourning the passing of a famous mathematician? I have included a possible calendar for quick reference and arbitrarily assigned dates for those about whom we are not sure (B = born, D = died). Attached also is a list of a few things each mathematician had done that would be understandable to at least some students from the remedial through the lower division college curriculum. It is not my intent to present all the accomplishments of the listed mathematicians. The following references are possible sources of more detailed historical information:

Bell, E.T., Men of Mathematics, Simon and Schuster, New York, 1965.

Boyer, Carl B., A History of Mathematics, John Wiley and Sons, New York, 1968.

Cajori, Florian, A History of Mathematical Notations, Vol. I, Open Court Publishing Company, La Salle, Illinois, 1974.

Debus, Allen G., Editor, World Who's Who in Science, Marquis-Who's Who, Inc, Chicago, Illinois, 1968.

deCamp, Spargue L., The Ancient Engineers, The MIT Press, Cambridge, Mass.

Historical Topics for the Mathematics Classroom, 31st Yearbook of the National Council of Teachers of Mathematics, Washington, D.C. 1969.

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Calendar of Mathematicians

January

1	Bernoulli, Johann	(D)
4	Cramer, Gabriel	(D)
6	Cantor, George	(D)
6	Finck, Thomas	(B)
8	Galileo	(D)
9	Ptolemy	(D)
10	Legendre, Andrien	(D)
12	Fermat, Pierre	(D)
14	Halley, Edmund	(D)
14	Hermite, Charles	(D)
15	Markov, Andrey	(D)
17	Adelard of Bath	(B)
20	Bombelli, Raffaelo	(D)
22	Eratosthenes	(B)
24	Wantzel, Pierre	(D)
25	Schwarz, Hermann	(B)
25	Lagrange, Joesph	(B)
26	Briggs, Henry	(D)
26	Cayley, Arthur	(D)
28	Recorde, Robert	(B)
29	Bernoulli, Daniel	(B)

February

1	Stokes, George	(D)
2	Ferrari, Ludovico	(B)
4	Wantzel, Pierre	(B)
5	Galileo	(B)
7	Hudde, Jan	(B)
9	Bolyai, Farkas	(B)
11	Descartes, Rene	(D)
12	Maclaurin, Colin	(B)
14	Al-Khwarizimi	(D)
16	Jordanus, Nemorarius	(D)
18	Jacobi, Karl	(B)
19	Weierstrass, Karl	(D)
21	Briggs, Henry	(B)
23	Gauss, Karl	(D)
24	Lobachevski	(D)
25	Pacioli, Luca	(D)
27	Fibonacci	(D)
29	Rudolf, Cristoff	(D)

March

1	Pell, John	(B)
3	Cantor, George	(B)
3	Hooke, Robert	(D)
5	Laplace, Pierre	(D)
5	Oughtred, William	(B)
8	Goldback, Christian	(B)

March (continued)

10	Rahn, Johann	(B)
11	Rheticus, Georges	(B)
13	Appollonus	(B)
15	Sylvester, James	(D)
17	Bernoulli, Daniel	(D)
18	DeMorgan, Augustus	(D)
18	LaHire, Philippe	(B)
20	Newton, Isaac	(D)
21	Muir, Thomas	(D)
21	Fourier, Jean	(B)
22	L'Hopital, Guillaume	(D)
24	Liouville, Joesph	(B)
26	Markov, Andrey	(B)
27	Pierson, Karl	(B)
28	Laplace, Pierre	(B)
30	Stevin, Simon	(D)
31	Green, George	(D)
31	Descartes, Rene	(B)

April

1	Archimedes	(B)
3	Pappus	(B)
4	Napier, John	(D)
6	Abel, Neils	(D)
8	Harriot, Thomas	(B)
10	Lagrange, Joesph	(D)
12	Lindemann, Ferdinand	(B)
14	Hugyens, Christian	(B)
15	Grassmann, Herman	(B)
15	Euler, Leonhard	(B)
16	Hudde, Jan	(D)
17	Bayes, Thomas	(D)
19	Hipparchus	(B)
21	LaHire, Philippe	(D)
21	Rolle, Michel	(D)
23	Bombelli, Rafaello	(B)
25	Poisson, Simeon	(D)
26	Finck, Thomas	(D)
26	Lambert, Johann	(B)
27	Pierson, Karl	(D)
29	Napier, John	(B)
30	Gauss, Karl	(B)

May

2	Gherardo of Cremona	(B)
4	Barrow, Issac	(D)
6	Oresme, Nicole	(B)
7	Clairaut, Alexis	(B)
9	Widman, Johannes	(D)
10	Monge, Gaspard	(B)
12	Chuquet, Nicholas	(B)
14	Mascheroni, Lorenzo	(B)
14	Emerson, William	(B)
14	Simpson, Thomas	(D)
16	Fourier, Jean	(D)
17	Clairaut, Alexis	(D)
18	Pappus	(D)
20	Emerson, William	(D)
22	L'Hopital, Gilleume	(B)
23	Cauchy, Augustin	(D)
25	Pythagoras	(B)
26	DeMoivre, Abraham	(B)
28	Archytus	(D)
30	Gunter, Edmund	(B)
31	Galois, Evarist	(D)

June

2	Eudoxos	(D)
4	Varignon, Pierre	(B)
5	Coates, Roger	(D)
6	Regiomontanus	(B)
8	Hugyens, Christain	(D)
9	Rheticus, Georges	(D)
11	Barrow, Issac	(B)
14	Maclaurin, Colin	(D)
16	del Ferro, Scipione	(B)
18	Pythagoras	(B)
19	Pascal, Blaise	(B)
21	Poisson, Simeon	(B)
22	Thales	(D)
24	Billingsley, Henry	(B)
26	Hippasos	(D)
27	DeMorgan, Augustus	(B)
30	Oughtred, William	(D)

July

1	Leibnitz, Gottfried	(B)
3	Stevin, Simon	(B)
4	Grundi, Luigi	(D)
6	Regiomontanus	(D)
8	Gherardo of Cremona	(D)
10	Coates, Roger	(B)
11	Oresme, Nicole	(D)
13	Lindemann, Ferdinand	(D)

July (continued)

14	Green, George	(B)
17	Hooke, Robert	(B)
18	Argand, Jean	(B)
20	Riemann, Georg	(D)
21	Rudolf, Cristoff	(B)
23	Bayes, Thomas	(B)
25	Jordanus, Nemorarius	(B)
27	Bernoulli, Johann	(B)
28	Monge, Gaspard	(D)
30	Mascheroni, Lorenzo	(D)
31	Cramer, Gabriel	(B)

August

2	Girard, Albert	(D)
4	Hamilton, William	(B)
6	Hippocrates	(D)
8	Roberval, Gilles	(B)
11	Archytus	(B)
13	Argand, Jean	(D)
13	Stokes, George	(B)
16	Bernoulli, Jakob	(D)
16	Cayley, Arthur	(B)
17	Fermat, Pierre	(B)
18	Taylor, Brook	(B)
19	Pascal, Blaise	(D)
20	DeWitt, Jan	(D)
20	Simpson, Thomas	(B)
23	Hipparchus	(D)
25	Abel, Neils	(B)
25	Muir, Thomas	(B)
27	Eratosthenes	(D)
30	Ptolemy	(B)

September

1	Mersenne, Marin	(D)
2	Hamilton, William	(D)
3	Sylvester, James	(B)
5	Saccheri, Girolamo	(B)
6	Viete, Francois	(B)
8	Liouville, Joseph	(D)
8	Mersenne, Marin	(B)
10	Girard, Albert	(B)
13	Herigon, Pierre	(B)
15	Hippasos	(B)
17	Riemann, Georg	(B)
18	Euler, Leonhard	(D)
18	Legendre, Adrien	(B)
20	Cardano, Girolamo	(D)
22	Archimedes	(D)
24	Cardano, Girolamo	(B)

September (continued)

24	DeWitt, Jan	(B)
25	Lambert, Johann	(D)
26	Grassmann, Herman	(D)
26	Mobius, August	(D)
29	Fibonanci	(B)

October

2	Eudoxus	(B)
4	Thales	(B)
5	Bolzano, Berhard	(B)
5	Ferrari, Ludovico	(D)
7	Grandi, Luigi	(B)
9	Chuquet, Nicholas	(D)
11	Lobachevski, Nikolai	(B)
13	Gregory, James	(D)
15	Torricelli, Evangelista	(B)
17	Rahn, Johann	(D)
18	Babbage, Charles	(D)
19	Widman, Johannes	(B)
21	Appollonus	(D)
23	Hippocrates	(B)
25	Galois, Evarist	(B)
25	Saccheri, Girolamo	(D)
25	Torricelli, Evangelista	(D)
27	Roberval, Gilles	(D)
28	Wallis, John	(D)
29	D'Alembert, Jean	(D)
31	Weierstrass, Karl	(B)

November

2	Boole, George	(B)
4	Gregory, James	(B)
5	Glaisher, James	(B)
7	Stirling, James	(B)
8	Halley, Edmund	(B)
8	Rolle, Michel	(D)
11	Cavalieri, Bonaventura	(B)
14	Leibnitz, Gottfried	(D)
15	Kepler, Johannes	(D)
16	D'Alembert, Jean	(B)
16	DeMoivre, Abraham	(B)
17	Mobius, August	(B)
19	Pacioli, Luca	(B)
20	Bolyai, Farkas	(D)
20	Goldbach, Christian	(D)
22	Billingsley, Henry	(D)

November (continued)

23	Wallis, John	(B)
25	Al-Khwarizimi	(B)
27	DeMoivre, Abraham	(D)
29	Wessel, Caspar	(B)
30	Cavalieri, Bonventura	(D)
30	Schwarz, Hermann	(D)

December

2	del Ferro, Scipione	(D)
4	Recorde, Robert	(D)
5	Stirling, James	(D)
7	Glaisher, James	(D)
8	Boole, George	(D)
10	Gunter, Edmund	(D)
10	Jacobi, Karl	(B)
12	Pell, John	(D)
13	Bolzano, Bernhard	(D)
13	Viete, Francois	(D)
14	Wessel, Caspar	(D)
16	Herigon, Pierre	(D)
18	Tartaglia, Niccolo	(B)
19	Adelard of Bath	(D)
22	Varigonon, Pierre	(D)
24	Hermite, Charles	(B)
25	Newton, Isaac	(B)
26	Babbage, Charles	(B)
27	Bernoulli, Jakob	(B)
27	Kepler, Johannes	(B)
29	Taylor, Brook	(D)

Abel, Niels (Norweigen) August 25, 1802 -- April 6, 1829

Proved that there is no general radical solution for fifth degree and higher equations. Gave the first general proof of the binomial theorem for arbitrary complex exponents. Investigated the convergence of Taylor series.

Adelard of Bath (English) ca 1090 -- ca 1150

One of the earliest translators from Arabic to Latin. Made the first translation of Euclid's Elements into Latin from Arabic. Introduced Muslim trigonometry to the Latin reading world with translations of Al-Khwarizimi's tables of astronomical calculations and sines. Used Arabic numbers which were later established by their acceptance by Fibonacci.

Al-Khwarizimi (Arabian) ca 800 - ca 850

Wrote books on arithmetic and algebra. From the title of his algebra book, Al-jabr Wa'lmuqabalab, we derived the word algebra (i.e. al-jabr → algebra). His arithmetic book gave a full account of the Hindu numerals and this is probably responsible for the notion that our numerals are of joint Hindu-Arabic origin. His notation came to be known as "that of Al-Khwarizimi" or "algorismi" or "algorithm" (and we now use this work to describe any particular rule or operation).

Apollonius (Greek) ca 262 BC -- ca 190 BC

First to show that all conics may be consideredsections of the same cone. Introduced the names: parabola, ellipse and hyperbola.

Archimedes (Greek) ca 287 BC -- ca 212 BC

Foremost mathematician of antiquity. Made extensive use of Eudoxos' method of exhaustion. He was killed in the Roman sack of Syracuse, Sicily.

Archytus (Greek) ca 428 BC -- ca 347 BC

Invented the pulley and screw. Intervened with the tyrant Dionysius to save Plato from execution. Wrote on applications of the arithmetic and geometric mean to music. Named the harmonic mean. He was a Pythagorean and gave a three dimensional solution for the problem of doubling a cube.

Argand, Jean (Swiss) July 18,1768 -- August 13, 1822

Pioneer in the use of complexnumbers to show all algebraic equations have roots. Introduced the term "modulus" and the Argand diagrams are named for him.

Babbage, Charles (English) December 26, 1792 --October 18, 1871

Devised basic principles of modern computers but was unable to impliment them because of the limitations of mechanical devices of his time. Invented first speedometer and locomotive cow catcher. Pushed for British acceptance of Leipnitz's notation in calculus over the more cumbersome form of Newton.

Barrow, Issac (English) 1630 -- May 4, 1677

Issac Newton's teacher at Cambridge and first to see the inverse relationship between integration and differentiation. Resigned his chair at Cambridge in favor of Newton in 1669 and became chaplin the the King of England.

Bayes, Thomas (English) 1702 -- April 17, 1761

First to use probability inductively and proposed the theorem for inverse probability where by probabilities of unknown cases are inferred from observed events.

Bernoulli, Daniel (Swiss) January 29, 1700 -- March 17, 1782

First to use a suitable notation for inverse trigonometric functions. Did pioneer work on partial differential equations. Introduced calculus into probability theory. Developed the theory of motion and statics of fluids. Was the son of Johann Bernoulli.

Bernoulli, Jakob (Swiss) December 27, 1654 -- August 16, 1705

Improved and developed the calculus of Leipnitz. Coined the term "integral" in 1690. Developed the law of large numbers. Pioneered in applying probability to statistics. Invented polar coordinates independently of Newton. Determined that the equation of a hanging uniform chain is a catenary.

Bernoulli, Johann (Swiss) July 27, 1667 -- January 1, 1748

Tutored L'Hopital in mathematics. Improved and developed the calculus of Leipnitz. Supported Leipnitz vigorously in the question of his independent discovery of calculus. First to publish what are now called Taylor and Maclaurin series. First to use the symbol "g" for the acceleration of gravity. Brother of Jakob Bernoulli.

Billingsley, Henry (English) 1531 -- November 22, 1606

Wrote the first tanslation into English of Euclid's Elements. He was chosen Lord Mayor of London in 1596.

Bolyai, Farkas (Hungarian) February 9, 1775 -- November 20, 1856

Developed and early non-Euclidean geometry.

Bolzano, Bernhard (Czeckoslovakain) October 5, 1781 -- December 13, 1848

Gave a proof of the binomial theorem (1816). Contributed to the arithmetization of calculus. With Cauchy, gave us the definition of continuity. Investigated the convergence of infinite series.

Bombelli, Rafaello (Italian) ca 1530 -- ca 1591

First to use square brackets: [ ]

Boole, George (English) November 2, 1815 -- December 8, 1865

Developed foundations of symbolic logic and algebra of sets. His work on the combination of sets is now used in the design of switching circuits of modern computers. Introduced differential operators to differential equations so that work with differential equations could become algebraic in nature. Wrote a textbook on the calculus of finite differences.

Briggs, Henry (English) February 1561 -- January 26, 1630

Invented the modern method of division. Proposed the use of logarithms to the base ten (common logarithms) instead of the Napierian system.

Cantor, George (German) March 3, 1845 -- January 6, 1918

Developed the theory of sets of points and the theory of irrational numbers. Defined real numbers, His development of set theory is the basis of modern analysis.

Cardano, Girolamo (Italian) September 24, 1501 -- September 20, 1576

First published the solution of the cubic equation, based on his own work and that of Tartaglia and Ferrari. This was published inspite of his oath of secrecy to Tartaglia.

Cauchy, Augustin (French) August 21, 1789 -- May 23, 1857

First to rigorously prove Taylor's theorem and to try to find a mathematical basis for ether. Originated the terms: conjugate and determinant.

Cavalieri, Bonaventura (Italian) 1598 -- November 30,1647

First to recognize the importance of logarithms and to popularize their use. Developed the ancient method of exhaustion into the fore runner of integral calculus. Proved Pappus' theorem rigorously.

Cayley, Arthur (English) August 16, 1821 -- January 26, 1895

Originated the explicit theory of matrices. First to use vertical lines to symbolized determinants.

Chuquet, Nicholas (French) 1445 -- 1500

First to give a clear explanation of the role of the zero symbol.

Clairaut, Alexis (French) May 7, 1713 -- May 17, 1765

Found that f_{xy} generally is equal to f_{yx} and used this to text for exactness of first order ordinary differential equations.

Cotes, Roger (English) July 10, 1682 -- June 5, 1716

Worked on the integration of rational functions through decomposition into partial fractions. Assisted Newton in the preparation of the second edition of the Principia.

Cramer, Gabriel (Swiss) July 31, 1704 -- January 4, 1752

Edited the works of Johann Bernoulli. Formally introduced the y-axis. Gave us Cramer's rule for solving simultaneous linear equations, though this rule was known to Maclaurin some twenty years earlier.

D'Alembert, Jean (French) November 16, 1717 -- October 29, 1783

Worked extensively in differential equations.

del Ferro, Scipione (Italian) 1465 -- 1526

First to solve the special class of cubic equations: $x^3 + px = q$

De Moivre, Abraham (French) May 26, 1667 -- November 27, 1754

First to discover "Stirling's Formula": $n! \doteq \sqrt{2\pi n}\, n^n\, e^{-n}$ and

De Moivre's Theorem: $(r(\cos\theta + i \sin\theta))^n = r^n(\cos n\theta + i \sin n\theta)$.

De Morgan, Augustus (English) June 27, 1806 -- March 18, 1871

Developed a new logic of relations. Gave us De Morgan's Formulas $(X \cup Y)^C = X^C \cap Y^C$ and $(X \cap Y)^C = X^C \cup Y^C$. Recommended writting a division problem on one line as follows:a/b, as a convenience for printers.

Descartes, Rene (French) March 31, 1596 -- February 11,1650

Founded analytic geometry and from whose name we have "cartesian" coordinates. First to unite the vinculum " —— " with the German radical sign ($\surd$) to give $\surd\overline{\quad}$. Introduced Hindu numberals as exponents on a given basis, though he only used positive powers. Used lower caseletters throughout his equations. Used first letters of the alphabet to stand for known quantities and x,y,z for unknowns. Used x most often because x is more available in French print shops than y or z. Coined the terms "real" and "imaginary".

DeWitt, Jan (Dutch) September 24, 1625 -- August 20, 1672

Gave focus-directrix ratio defintions of the conics (this had not previously been done by Appolonius). Coined the work directrix. Reduced all second degree equations in x and y to conical form through translation and rotation of axes. He was appointed Grand Pensionary of Holland in 1653 and restored the finances of Holland. He was dismissed from office in 1672 when the French invaded the Netherlands. He was seized by an infuriated mob that tore him to pieces.

Emerson, William (English) May 14, 1701 -- May 20, 1782

First to use the symbol "$\propto$" for "varies in constant ratio to".

Eratosthenes (Greek) ca 275 BC -- ca 195 BC

Invented the "sieve of Eratosthenes". Head of Alexandria Library. Estimated the diameter of the Earth at 25,000 miles. Died of voluntary starvation as he approached total blindness.

Euclid (Greek) ca 300 BC -- ca 230 BC
His book, Elements, summarized the field of mathematics to his time.

Eudoxos (Greek) ca 408 BC -- ca 355 BC

Created the general theory of proportions set forth in Books 5,6,7 of Euclid's Elements. Created the method of exhaustion, the forerunner of integration. Showed that the volume of a cone and pyramid were respectively 1/3 that of the cylinder and prism of the same base and height.

Euler, Leonhard (Swiss) April 15, 1707 -- September 18, 1783

Studied under Johann Bernoulli. Most prolific mathematician of all time. First to show that infinite series are usefully employed only when they are convergent. Converted trigonometry from Ptolemaic chord measurements to ratios. Introduced the functional notation, f(x); and the symbols e, i, Σ , Δ (for differential). Popularized series solutions of differential equations, the

Euler (continued)

symbol π, polar coordinates, and parentheses: ( ). First to use imaginary exponents. Changed logarithms from Napier's geometric rations to exponential form. Developed the modern labeling of triangles: capital letters for angles and lower case letters for the sides. One of the first to work in the third and fourth quadrants of graphs. Made numerous improvements in differential and integral calculus. The form of the modern college calculus course is due generally to him. He stressed Leipnitz's notation because of his link the Leipnitz through Johann Bernoulli. First to integrate linear differential equations with constant coefficients. Introduced partial differential equations. Showed that conic sections are represented by the general equation of second degree in two variables. Discovered that cubic equations have three roots and showed how these may be determined. Coined the terms: center of mass, center of inertia andmoment of inertia.

Fermat, Pierre (French) August 17, 1601 -- January 12, 1665

Founded, with Pascal, probability theory. Worked out equations for geometric figures shortly before Descartes published his analytic geometry and thus may be considered an independent discoverer of analytic geometry. Applied the idea of infinitesimals to questions of area, maxima, minima and tangents. His method for finding the tangent line to a curve is basically the same as that using the modern definition of the derivative. He performed extensive work in number theory.

Ferrari, Ludovico (Italian) February 2, 1522 to October 5, 1565

First to solve quartic equations. Student of Cardano.

Fibonacci, Leonardo (Italian) ca 1170 -- ca 1230

Best known work is Liber Abaci (i.e. Book of Abacus) and was instrumental in putting an end to the old Roman number system. It gave a systematic explanation of the use of Hindu numerals and the value of positional notation. First to use the fraction line.

Finck, Thomas (Danish) January 6, 1561 -- April 26, 1656

Coined the trigonometry terms tangent and secant. First to publish the law of tangents. Tangent coined because the shadow cast on a horizontal sundial lies along the tangent to the circle centered at the tip of the sundial with radius equal to the gnom.

Fourier, Jean (French) March 21, 1768 -- May 16, 1830

Governor of lower Egypt under Napolean (1798 -- 1802). Evolved series, "Fourier series", which is important in harmonic analysis. He thus devised a method of representing discontinuous functions by trigonometric series which provides the source of all modern methods in mathematical physics of problems where boundary values are fixed.

Galileo Galilei (Italian) February 5, 1564 -- January 8, 1642

His work with infinitesimals and that of many others set the stage for Leipnitz's and Newton's work in calculus.

Galois, Evarist (French) October 25, 1811 -- May 31, 1832

Gave a criteria for the solvability of: $a_0x^n + a_1x^{n-1} + \cdots + a_{n-1}x + a_n = 0$. in terms of rational operations and nth roots of the coefficients.

Gauss, Karl (German) April 30, 1777 -- February 23, 1855

Gave the first proof of the fundamental theorem of algebra (as he called it) that every algebraic equation must have at least one root. Proved the fundamental theorem of arithmetic -- every natural number can be represented as the product of primes in one and only one way. Gave first rigorous proof of the binomial theorem (previously stated by Newton). Demonstrated that a circle can be divided into 17 equal arcs by classical methods of geometry and one of the first to prove the impossibility of performing certain constructions by these methods. Discovered the method of least squares. Founder of the mathematical theory of electricity. Originated the vectorial representation of complex numbers. He wrote, "The true metaphysics of $\sqrt{-1}$ is difficult". His results and reputation settled the acceptance of imaginary numbers. Originated the term complex number.

Gherardo of Cremona (Italian) ca 1114 -- ca 1187

Translated mathematical, astronomical and medical works from Arabic to Latin including the Almagest by Ptolemy. It is generally through this translation that Ptolemy's work became known in Europe. The early maps of the Middle Ages had as their prototype the maps of Ptolemy (constructed some 1000 years before). Ptolemy had underestimated the size of the Earth which convinced Colombus of the practability of the western route to the Orient. Gherardo incorrectly translated an Arabic manuscript to give us the word "sine".

Girard, Albert (French) 1595 -- 1632

Stated but did not prove the fundamental theorem of algebra (one version-- the number of roots of an equation is equal to its degree). First to study negative roots which were later developed by Descartes. First to use the symbol $\pm$, the abreviations sin, tan, sec and to put an index in the opening of the radical sign $\sqrt[]{\ }$.

Glaisher, James (English) November 5, 1848 -- December 7, 1928

First to use the symbol $\uparrow$ for exponentiation.

Goldback, Christian (German) March 8, 1690 -- November 20, 1764

Gave us Goldbach's conjecture (as yet unproved) that every even integer is the sum of two primes.

Grandi, Luigi (Italian) October 7, 1671 -- July 4, 1742

Studied the roses: $r=a\cos(n\theta)$ and $r=a\sin(n\theta)$

Grassmann, Herman (German) April 15, 1809 -- September 26, 1877

Invented tensor calculus.

Green, George (English) July 14, 1793 -- March 31,1841

Gave us Green's Theorem. Introduced the term "potential".

Gregory, James (Scottish) November 1638 -- October 1675

First to distinguish between convergent and divergent series. He coined the term converge.

Gudermann, Christoph (German) March 25,1798 -- September 25, 1851

Calculated first table for hyperbolic functions.

Gunter, Edmund (English) 1581 -- December 10, 1626

Coined the term cosine as complement of sine and cotangent as complement of tangent.

Halley, Edmund (English) November 8, 1656 -- January 14, 1742

Urged Newton to write the Principia and published it at his own expense. Defended Newton's priority in the invention of calculus against attacks by Johann Bernoulli and others.

Hamilton, William (Irish) August 4, 1805 -- September 2, 1865

Gave first explicit discussion of complex numbers treated as ordered pairs. First to use the term "associative property".

Harriot, Thomas (English) 1560 -- July 2, 1621

First to factor algebraic expressions and introduced the inequality symbols , . He was mathematical advisor to Sir Walter Raleigh and was sent as Surveyor to Virginia Colony in 1585. First Englishman to explore and describe

Harriot (continued)
the natural history of North America (brought tobacco plants and potatoes to Europe).

Herigon, Pierre (French) ca 1630

First to use the symbol $\perp$ for perpendicular and $<$ for angle. The angle symbol was later modified to $\angle$ by Oughtred (1657) to avoid confusion with Harriot's sign for "less than".

Hermite, Charles (French) December 24, 1822 -- January 14, 1901

Showed in 1873 that e is transcendtal (i.e. e can not be the root of any polynomial equation with integral coefficents). Solved 5th order equations using elliptic functions.

Hipparchus (Greek) ca 150 BC

Laid foundations of trigonometry with the construction of the first trigonometry table. This table gave the length of the chord of a circle for a given central angle.

Hippasos (Greek) ca 500 BC

Was a member of the Pythagorean society but was expelled for divulging the discovery of the existence of irrational numbers.

Hippocrates (Greek) ca 450 BC

First mathematics teacher to accept money for teaching. The Pythagorean's were not allowed to accept pay. First to use letters in geometric figures.

Hooke, Robert (English) July 17, 1635 -- March 3, 1703

Assistant to Robert Boyle. Involved with controversies with Newton over the wave/particle nature of light. Caused Newton to cease publications until after Hooke's death. Hooke felt Newton had not given him enough credit in the Principia for his statement of the inverse square law. Newton was first to justify the inverse square law mathematically.

Hudde, Jan (Dutch) 1628 -- April 16,1704

First to allow a literal coefficient in an algebraic expression to assume both positive and negative values.

Hugyens, Christian (Dutch) April 14, 1629 -- June 8, 1695

Invented the pendulum clock with escapement. Calculated the radius of curvature of a plane curve. Tutored Leipnitz in mathematics.

Jacobi, Karl (German) December 10,1804 -- February 18,1851

Early researcher in the area of determinants. Jacobian is named for him.

Jordanus, Nemorarius (Westphalian) 1200 -- 1237

Second general of the Dominican Order. Gave the first correct formulation of the inclined plane:

$F = w \sin\theta$

Used letters to stand for magnitudes.

Kepler, Johannes (Swabian) December 27, 1571 -- November 15, 1630

Coined the word "focus" (Latin for hearthside)

Lagrange, Joesph (Italian) January 25, 1736 -- April 10, 1813

Used the phrase "derived function" from which we get the word "derivative". Originated the notation: $f'(x)$, $f''(x)$, $f'''(x)$. Developed the method of variation of parameters for nonhomogeneous ordinary linear differential equations and Lagrange multipliers. First to recognize the importance of and use Taylor series actively. Proved that every positive integer is the sum of at most four perfect squares. Very active in the creation of the decimal based metric system following the French revolution.

La Hire, Philippe (French) March 18,1640 -- April 21, 1718

Gave earliest systematic use of three coordinates in analytic geometry. Coined the word "origin" as applied to the point (0,0).

Lambert, Johann (German) April 26, 1728 -- September 25, 1777

Coined the terms sinh, cosh, tanh. Showed π is irrational. The unit of light is named after him. First to recognize that there are stellar systems other than the Milky Way.

Laplace, Pierre (French) March 28, 1749 -- March 5, 1827

Contributed heavily to probability (and it has been said that probability owes more to Laplace than any other mathematician). Gave first proof of the method of least squares first published by Legendre though independently discovered by Gauss some ten years earlier. Rescued from oblivion Buffon's needle problem (method of calculating π) and the work on invers probabilities by Thomas Bayes. With Legendre introduced partial differential equations into the study of probability. Presented the Laplace transform in 1812. Minister of the Interior (1799) under Napoleon.

Legendre, Adrien (French) September 18,1752 -- January 10, 1833

Discovered the method of least squares independently of Gauss and first to publish this method. First to use the modern symbolism for partial derivative: $\frac{\partial v}{\partial x}$

Leibnitz, Gottfried (German) July 1, 1646 -- November 14, 1716

Independent inventor and first to publish results in the calculus. First to use the raised dot, $\cdot$, as a symbol for multiplication. In a letter to Johann Bernoulli on July 29, 1698 he wrote," I do not like x as a symbol for multiplication, as it is easily confounded with $\dot{x}$; ... often I simply relate two quantities by an interposed dot and indicate multiplication by ZC·LM. Hence, in designating ratio I use not one point but two points, which I use at the same time for division." Thus Leipnitz was the first to use a colon to express a ratio (A:B) and introduced the modern notation for proportion (a:b=c:d). Gave the first infinite series convergence test, i.e. the alternating series test. First to use the symbols $\int$ and d as in $\int x^3 dx$ and to investigate variable exponents as x^x.

Taught himself Latin at 8 and then Greek soon after. He never married and served as privy councilor, court advisor, librarian, historian to the Dukes of Braunschweig-Luneberg (Johann Friedrick, George Ludwig, Ernst August) at Hanover 1676 -- 1716. Ernst August married Sophia (granddaughter of James I of England) and their eldest son succeeded Queen Anne to the throne of England becoming George I (1714 -- 1727). Leibnitz did not follow George to England possibly because of the bitter controversy which had arisen between the supporters of Newton and Leibnitz concerning who was the first with the calculus. Leibnitz later died in obscurity.

Leibnitz developed the forerunner of modern symbolic logic. He tried to develop a universal symbolism and an attendant algebra so that one might calculate truth from any proposition.

L'Hopital, Guillaume (French) 1661 -- 1704

Wrote the first calculus textbook (1696). This contained L'Hopital's rule which was evidently first discovered by Johann Bernoulli and given to L'Hopital in return for a stipend.

Lindemann, Ferdinand (German) April 12, 1852 -- 1939

First to show that π is a transcendental number (1882) and thus that it is impossible to construct a square of equal area to a given circle using compass and ruler alone. Developed a method of solving equations of any degree using transcendental functions.

Liouville, Joseph (French) March 24, 1809 -- September 8, 1882

Gave the first proof of the existence of transcendental numbers, i.e. numbers which can not be roots of any polynomial equation with integral coefficients.

Lobachevski, Nikolai (Russian) October 11, 1793 -- February 24, 1856

Independently of J. Bolyai introduced the first comprehensive system of non-Euclidean geometry (though first conceived but not published by Gauss). Showed that an infinite number of lines can be drawn in a plane parallel to a given line through a given point (later Einstein showed that the universe is non-Euclidean in structure).

Maclaurin, Colin (Scottish) February 1698 -- June 14, 1746

Put Newton's calculus on a sound mathematical foundation. First to give the correct theory for distinguishing maxima from minima. First also to discover Cramer's rule.

Markov, Andrey (Russian) 1856 -- 1922

Student of Tcheysheff and originator of Markov chains of linked probabilities.

Mascheroni, Lorenzo (Italian) May 14, 1750 -- July 30, 1800

Proved that all constructions in elementary geometry possible with a ruler and compass are possible using only a compass.

Mersenne, Marin (French) September 8, 1588 -- September 1, 1648

Through his correspondence kept Europe aware of the major mathematical discoveries of his time.

Mobius, August (German) November 17,1790 -- September 26, 1868

Student of Gauss. Founder of Topology. Mobius strip is named for him.

Monge, Gaspard (French) May 10,1746 -- July 28,1818

Inventor of Descriptive Geometry.

Muir, Thomas (Scottish) August 25, 1844 -- March 21, 1934

Inventor of the radian or"radial angle".

Napier, John (Scottish) 1550 -- April 4, 1617

Invented logarithms. First to use a dot as the separator between the integral and fractional part of a decimal fraction (i.e. invented the decimal point.)

Newton, Issac (English) December 25, 1642 -- March 20, 1726

First to formulate the calculus (though Leibnitz was first to publish his independent creation of calculus). Discovered the binomial expansion. Published the Principia in 1687 at Halley's urging and expense. Invented polar coordinates independently of Jakob Bernoulli. First to use negative and fractional exponents.

Oresme, Nicole (French) 1323 -- July 11, 1382

First to graph functions and to prove the divergence of the harmonic series.

Oughtred, William (English) March 5, 1575 -- June 30, 1660

Fostered the Saint Andrews cross (X) as the symbol for multiplication. Created the first rectilinear and circular logarithmic slide rule.

Pacioli, Luca (Italian) 1445 -- 1517

Authored first printed work on algebra.

Pappus of Alexandria (Greek) ca 300 AD

Presented Pappus' theorem which is the most general theorem involving the calculus to be found in antiquity.

Pascal, Blaise (French) June 19, 1623 -- August 19, 1662

With Fermat set the foundations of the modern theory of probability and combinatory analysis. Pascal's triangle is named for him. Founder of the field of hydrodynamics.

Pierson, Karl (English) March 27, 1857 -- April 27, 1936

Introduced the chi-square test to statistics in 1900.

Pell, John (English) March 1, 1611 -- December 12, 1685

Introduced the division symbol, $\div$, into England from where it traveled to Americal.

Poisson, Simeon (French) June 21, 1781 -- April 25, 1840

Contributed heavily to probability theory and the Poisson distribution is named for him.

Ptolemy of Alexandria (Greek) -- ca 140 AD

Gave the sum and difference formulas for sines and cosines. Divided the degree into minutes and seconds. Our words come from the Latin translation of of his work:

degree is divided into 60 parts :"partes minutae prima"--first small part
from minutae we get minute

minute is divided into 60 parts :"partes minutae secundae"--second small part
from secundae we get second

Earliest maps of the middle ages had as their prototype the maps of Ptolemy made 1000 years earlier. His under estimation of the size of the earth encouraged Columbus in his decision to try to reach the East by sailing west from Europe.

Pythagoras (Greek) ca 532 BC

Proved, though did not discover, the Pythagorean Theorem; that the sum of the angles in a triangle equals two right angles, that angles inscribed in a semi-circle are right angles. Set up a secretive and politicaaly powerful cult whose beliefs were based on the nature of numbers.

Rahn, Johann (Swiss) March 10,1622 -- 1676

First to use the six pointed star $*$ for multiplication, the symbol $\div$ for division and $\therefore$ for "therefore".

Recorde, Robert (English) 1510 -- 1558

First to use the equal sign, =. This symbol was popularized through its acceptance by Leibnitz and Newton.

Regiomontanus (aka -- Johann Muller) (German) June 6, 1436 -- July 6, 1476

Through his print shop, translations into Latin and his own studies; he advanced the study of trigonometry and algebra in Europe. His influence is seen in the work of Copernicus.

Rheticus, Georges (Austrian) 1514 -- 1576

First European to use trigonometric functions as the ratio of sides of triangles rather than arcs of a circle of a given radius.

Riemann, Georg (German) September 17, 1826 -- July 20, 1866

Developed the definition of the definite integral which bears his name. Deepened the ideas of Bolyai and Lobachevsky and developed a new non-Euclidean system of geometry (Riemmannian geometry) and a theory of space which provided a geometric foundation for modern physical theory (e.g. Einstein's work).

Roberval, Gilles (French) August 8, 1602 -- October 27,1675

First to graph the sine curve.

Rolle, Michel (French) April 21, 1652 -- November 8, 1719

Formulated Rolle s Theorem (1691). At first he critized the foundations of the calculus. After he was convinced of its soundness by Varignon, the oposition to calculus in Europe collapsed and it proceeded through an unimpeded and rapid development on the Continent.

Rudolf, Cristoff (German) 1500 -- 1545

First to use the radical sign $\sqrt{}$.

Saccheri, Girolamo (Italian) September 5, 1667 -- October 25, 1733

First to discuss the consequences of denying the parallel axiomand to suggest construction of non-Euclidean geometry independent of it.

Schwarz, Hermann (German) January 25, 1843 -- November 30, 1921

The Schwarz inequality is named for him.

Simpson, Thomas (English) August 20, 1710 -- May 14, 1761

Simpson's rule for approximating areas is named for him.

Stevin, Simon (Belgian) 1548 -- between February 20 and April 18, 1620

First systematic user of decimal fractions. Continued Archimede's work on statics and found the force due to water on the face of a dam.

Stirling, James (Scottish) 1692 -- December 5, 1770

Learned secrets of Venitian glass making and barely escaped Venice with his life. The approximation $n! \doteq \sqrt{2\pi n}\, n^n e^{-n}$ is named for him.

Stokes, George (Irish) August 13,1819 -- February 1, 1903

Stokes' Theorem is named after him.

Sylvester, James (English) September 3, 1844 to March 15, 1897

Founder (with Cayley) of the theory of algebraic invariants which is essential to the theory of relativity. Coined the words "discriminant" for B^2-4AC and "Jacobian".

Tartaglia, Niccolo (Italian) 1505 -- December 13, 1557

Credited by Cardano with discovery of the solution of the cubic equation:

$$ax^3+bx^2=c$$

First to use parenthesis in mathematical expressions. These were popularized by their use by Leibnitz, Euler and D. Bernoulli.

Taylor, Brook (English) August 18,1685 -- December 29, 1731

Taylor series is named for him. Originated the calculus of finite difference. Supported Newton in the battle with the Europeans over credit for the discovery of the calculus.

Thales of Miletos (Greek) ca 636 BC

Gave first recorded attepts to find naturalistic instead of mythological interpretations of nature. Introduced Geometry to Greece (from Babalonia) and invented the logical proof in geometry. Proved: 1) circle is bisected by a diameter. 2) Base angles of an isoceles triangle are equal 3) two straight lines intersecting each other produce equal and opposite angles.

Torricelli, Evangelista (Italian) October 15, 1608 -- October 25, 1647

Gave first proof that an infinite area (as that bounded by $xy=a^2$ and $x=b$) when revolved around the x axis gave a finite volume. Gave first graph of the logarithm ($x = \log y$).

Varignon, Pierre (French) 1654 -- December 22, 1722

Originated the term logarithmic spiral for what we write today as $r=ae^{i\theta}$. Cinvinced Rolle of the soundness of the foundations of the calculus.

Viete, Francois (French) 1540 -- December 13, 1603

Founder of modern algebra. Introduced letters as general (though) positive coefficients. Rejected negative roots and pushed the use of decimal fractions rather than sexagesimal.

Wallis, John (English) November 23, 1616 -- October 28, 1703

Made Descartes' work on analytic geometry intelligible. Prepared way for Newton's work on the calculus. Indtroduced the term "mantissa" in logarithms and the symbol for infinity, ∞ .

Wantzel, Pierre (French) 1814 --1848

First to prove the impossibility of trisecting an angle with straight edge and compass alone.

Weierstrass, Karl (German) October 31, 1815 -- February 19,1897

Contributed to the arithmetization of analysis and gave us the δ-ϵ definition of the limit.

Wessel, Caspar (Norweigian) 1745 -- 1818

Gave first graphical representation of complex numbers (now call Argand diagrams).

Widman, Johannes (Bohemian) 1460 -- 1500

First to use in print the Greek cross + for addition and - for subraction. The use of these symbols by Viete established them.